Ref. Ares(2025)1629612 - 28/02/2025

D7.5 – Risk Management Plan Part 1

Deliverable summary

Deliverable number	D7.5
Deliverable title	RETIME Deliverable D7.5 – Risk Management Plan Part 1 – 28- February-2025 -version-0.6
Deliverable related Work Package	WP7
Deliverable type	Report
Dissemination level	Public
Contractual date of delivery	M10 – February 2025
Actual date of delivery	28-February-2025
Deliverable authors	Lubica Greplova (DTU)
Leading partner responsible for the deliverable	DTU
Deliverable reviewers	Ainhoa Pérez de Arrilucea (TEC), Chiara Fonio (ICONS), Stefania Stellacci (ISCTE), Razgar Ebrahimy (DTU), Catarina Ferreira da Silva (ISCTE)
Deliverable version	0.6
Deliverable total number of pages	41
Project grant number	101147113
Project acronym	RETIME
Project title	Urban Adaption and Alert Solutions for a TIMEly (re)Action
Funding scheme	HORIZON Action Grant Budget-Based
Project duration	May 2024 – April 2028 (48 months)
Call	Efficient, sustainable and inclusive energy use HORIZON-CL5-2023-D4-02
Topic	HORIZON-CL5-2023-D4-02-02
Type of action	HORIZON Innovation Action
Start date of the project	1 May 2024
Project Coordinator	ISTAR-ISCTE – University Institute of Lisbon (RETIME@ISCTE-IUL.PT)

Co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them.

Executive summary

This report outlines the methodology and status of general and specific risks associated with research, management, dissemination, and exploitation activities within the RETIME project. It provides a detailed account of mitigation strategies and clearly defines the roles and responsibilities of the RETIME project management team, Work Package Leaders (WPLs), Task Leaders (TLs), and Local Desk Members (LDMs).

The primary objective of the Risk Management Plan (RMP) is to effectively prevent undesirable risks, implement mitigation measures, and apply relevant monitoring procedures to address potential negative risks that could significantly impact the successful progression of the RETIME project. The RMP provides RETIME consortium members with a clear guideline to proactively address and manage risks.

As outlined in the Grand Agreement (GA), the D7.5 report is the first version of the deliverable Risk Management Plan Part 1, submitted to the European Commission (EU). The final version of this report will be updated with deliverable D7.7. Part 2 in month 24 (April 2026). As a dynamic and living document, the RMP will be continually updated with input from all contributors throughout the project's duration to ensure its relevance and effectiveness.

D7.5 is meant for Consortium members, industrial stakeholders, and representatives of Small and Medium Enterprises (SMEs).

History of changes

Title of the document	Version number	Changes	Who	Date
RETIME Deliverable D7.5 – Risk Management Plan Part 1 – 26-September-2024-version-0.1	0.1	Initial structure	Lubica Greplova (DTU)	26.09.2024
RETIME Deliverable D7.5 – Risk Management Plan Part 1-23-January-2025-version-0.2	0.2	Review	Stefania Stellacci (ISCTE)	23.01.2025
RETIME Deliverable D7.5 – Risk Management Plan Part 1-03-February -2025-version-0.3	0.3	Comments addressed	Lubica Greplova (DTU)	03.02.2025
RETIME Deliverable D7.5 - Risk Management Plan Part 1-18-February -2025-version-0.4	0.4	Review and Edit	Razgar Ebrahimy (DTU)	18.02.2025
RETIME Deliverable D7.5 - Risk Management Plan Part 1-26-February -2025-version-0.5	0.5	Review	Ainhoa Pérez de Arrilucea (TEC), Chiara Fonio (ICONS), Lubica Greplova (DTU), Stefania Stellacci (ISCTE)	26.02.2025
RETIME Deliverable D7.5 - Risk Management Plan Part 1-28-February -2025-version-0.6	0.6	Review	Catarina Ferreira da Silva (ISCTE)	28.02.2025

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List of acronyms and abbreviations

API	Application Programming Interface
CA	Consortium Agreement
DK	Denmark
EB	Economic Barrier
ENVB	Environmental Barrier
ER	Economic Requirement
ES	Estonia
EU	European Union
GA	Grant Agreement
IP	Intellectual property
IT	Italy
LDM	Local Desk Member
LU	Luxemburg
PB	Political Barrier
PC	Project Coordinator
PMT	Project Management Team
PO	Project Officer
PST	Project Support Team
PT	Portugal
RAL	Risk Management Log
RB	Regulatory Barrier
REM	Risk Exposure Matrix
RMGS	Risk Management Governance Structure
RMP	Risk Management Plan
RRT	Risk Reporting template
SB	Social Barrier
SK	Slovakia
SME	Small and Medium Enterprise
TB	Technological Barrier
TL	Task Leader
WP	Work Package
WPL	Work Package Leader

1. Introduction

The Risk Management Plan (RMP) serves as a foundational document for defining the strategies, processes, and responsibilities involved in managing risks throughout the RETIME project.
It includes a detailed assessment of potential risks and specifies the strategies and actions the consortium will implement to address them throughout the lifespan of the project. The main goal of the RMP is to accurately address unwanted risks and act by mitigating or applying appropriate measures to control potential negative risks that could significantly impact the project's positive progress. The work that falls within this deliverable will be updated regularly (every six months) as a part of *WP7. Project Management and Coordination*, *T7.5. Project Risks Response Strategy and Mitigation Measures*.
This deliverable structured into three sections. The introduction section (*Section 1*) is followed by *Section 2* that establishes a clear framework for accountability and coordination in addressing risks, while *Section 3* focuses on risk management processes, and it is the core of the document. This section consists of six subsections:
i) *Risk identification*;
ii) *Risk analysis*: Details the methodology for evaluating identified risks;
iii) *Risk Mitigation:* Highlights strategies to minimise the likelihood or impact of risks;
iv) *Risk Documentation and Reporting subsection:* Outlines the processes for recording and communicating risks;
v) *Risk monitoring and controlling*: Highlights the consortium's responsibilities for continuous risk monitoring;
vi) *Risk communication and reviewing*: Highlights the importance of transparent communication among consortium partners.
By following the guidelines outlined in this report, consortium members will ensure the timely and effective management of potential risks. Ultimately, this will support the successful achievement of the project objectives.

1.1. Interrelated RETIME deliverables

D7.5 is closely related to three RETIME deliverables: *D7.1. Project Management Plan and Work Breakdown Structure (WBS) Part 1*, which details the organisational structure and role and responsibilities of WP Leaders and Task Leaders; *D7.2. Quality Plan*, which defines potential risks related to ethical issues compliance in several RETIME activities; and *D7.3 Guidelines for administrative, financial, technical reporting and reviews*.

2. Risk Management Governance Structure

2.1. Roles and responsibilities

This section outlines the roles and responsibilities within the RETIME project framework concerning risk management. It provides a clear definition of the key stakeholders involved in identifying, assessing, and mitigating risks, and it demonstrate how each role contributes to maintaining a proactive approach to risk management, ensuring that potential issues are identified early and addressed effectively. By establishing these responsibilities among RETIME Beneficiaries, the project aims to guarantee the achievement of the key objectives while promoting a culture of accountability and continuous improvement in risk mitigation. Figure 1 outlines risk reporting and communication governance structures (RMGS) within RETIME.

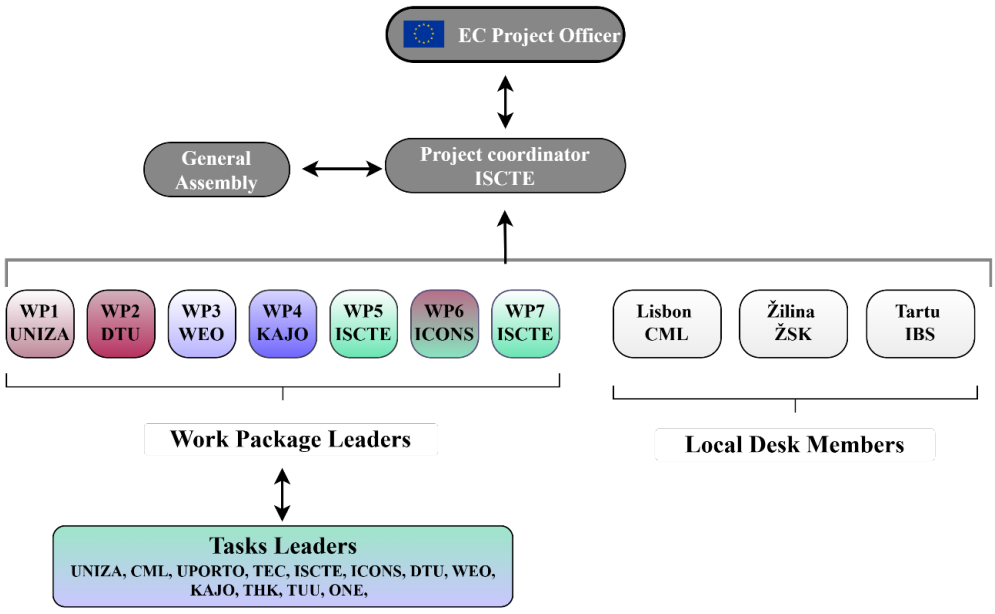


Figure 1. Risk management governance structure (RMGS).

2.1.1. Project management team

The Project Management Team (PMT) plays a vital role in the risk management process, ensuring that potential threats to the project's success are proactively identified, assessed, and mitigated. The PMT's responsibilities extend across all stages of risk management, from initial risk identification to continuous monitoring and resolution. The key roles within the PMT and their responsibilities in Risk Management are identified below:

Project Coordinator (PC):

The PC leads the risk management process, overseeing the implementation of the risk management plan and ensuring that all partners comply with the defined procedures. The PC is responsible for:

- Supervising risk identification and mitigation strategies across work packages.
- Monitoring deadlines and project milestones to identify potential delays or issues.
- Communicating with the Project Officer (PO) regarding any significant risks or changes that could have a significant impact on project outcomes.
- Coordinating responses to risks that could affect the project's budget, timeline, or deliverables.

Project Support Team (PST):

This team provides administrative and logistical support to manage risks related to compliance, reporting, and coordination. Key responsibilities include:

- Assisting in the documentation of risks and mitigation actions.
- Ensuring that all partners follow the procedures highlighted in this report.
- Supporting the project management team, including monitoring for deviations and helping mitigate risks.

By maintaining a proactive approach to risk management, the PMT and PST ensures that the RETIME project operates efficiently, adheres to its timeline, and achieves its intended outcomes despite uncertainties or challenges across each pilot site. Table 1 lists the project management and project support team members.

Table 1. Project management team (PMT).

RETIME	Name	Beneficiary Acronym	Country
Project management team	Catarina Ferreira da Silva	ISCTE	PT
	Stefania Stellacci	ISCTE	PT
	Pedro Mariano	ISCTE	PT
Project support team	Lubica Greplova	DTU	DK
	Razgar Ebrahimy	DTU	DK

2.1.2. Work Package Leaders and Task Leaders

The RETIME project consists of seven Work Packages (WPs), each further divided into specific tasks, as detailed in *D7.1. Project Management Plan and Work Breakdown Structure (WBS) Part 1 (Section 4.2)*. Leadership within the project is defined, with each work package overseen by a

Work Package Leader (WPL) and individual tasks managed by Task Leaders (TLs). WPLs and TLs play a crucial role within the project's risk management governance framework. The roles and responsibilities of WPLs and TLs are:

- Identifying risks early within their WP and Task, to ensure proactive management, prevent disruptions and align with the project's risk management framework.
- Conducting regular risks assessment, to monitor progress and flag potential issues to the PC and PST.
- Developing and implementing risk mitigation strategies tailored to their WP.
- Collaborate closely with TLs and project partners to address risk promptly and effectively.
- Document identified risks and corresponding mitigation measures in the Risk Management Log (RAL).
- Communicating with PC and PST every six months via email or meetings to review and discuss risks identified during the previous semester.

Table 2 lists Work Package Leaders for each work package.

Table 2. List of RETIME Work Package Leaders (WPLs).

Work Package	Name	Beneficiary Acronym	Country
WP1	Tatiana Kováčiková	UNIZA	SK
	Ľuboš Buzna	UNIZA	SK
	Katarína Hollá	UNIZA	SK
WP2	Rongling Li	DTU	DK
	Razgar Ebrahimy	DTU	DK
WP3	Imeshi Weerasinghe	WEO	LU
	Charlotte Wirion	WEO	LU
WP4	Milan Kalas	KAJO	SK
	Peter Beno	KAJO	SK
WP5	Catarina Ferreira da Silva	ISCTE	PT
	Stefania Stellacci	ISCTE	PT
	Osmar Zózimo De Souza	ISCTE	PT
WP6	Sofia Finzi	ICONS	IT
	Francesca Galloni	ICONS	IT
	Gustavo Jacomelli	ICONS	IT
WP7	Catarina Ferreira da Silva	ISCTE	PT
	Stefania Stellacci	ISCTE	PT
	Osmar Zózimo De Souza	ISCTE	PT

2.1.3. Local Desk Members

Local Desk Members (LDMs), indicated in Table 3, play a critical role in ensuring the successful implementation and validation of demonstration activities across RETIME pilot sites (in Portugal, Slovakia, and Estonia) as well as overseeing the social impact of the solutions at local levels and the technical progress of the RETIME solutions and tools. Their key roles and responsibilities are:

- Identifying risks early within their respective pilot site, including developing and implementing mitigation strategies, and ensuring contingency plans are in place.
- Continuously monitoring day-to-day activities to detect potential issues, assess the effectiveness of mitigation measures for identified risks and track changes in risk levels.
- Collaborating with the Project Coordinator (PC), Work Package Leaders (WPLs), and Task Leaders (TLs) to align local mitigation actions with the project's objectives.
- Providing regular risk-related updates to the PC and Project Support Team (PST), detailing risks, mitigation efforts, and deviations affecting project milestones and deliverables.

By fulfilling these roles and responsibilities, LDMs ensure that risks are managed efficiently, contributing to the project's overall success and the achievement of its intended outcomes.

Table 3. List of RETIME Local Desk Members (LDMs).

Pilot site	Name	Beneficiary Acronym	Country
Lisbon	Cristina Pereira	CML	PT
	Margarida Revés	CML	PT
Žilina	Dana Gavalierová	ŽSK	SK
	Lucia Lašová	ŽSK	SK
Tartu	Rene Tõnnisson	IBS	ES
	Kai Aet Sild	IBS	ES

3. Risk Management Process

Unforeseen events can lead to deviations from the plan, presenting either opportunities or potential losses. Effective risk management aims to minimise losses by identifying vulnerabilities and implementing mitigation strategies. This is why in the literature, effective risk management encompasses risk identification, analysis, evaluation, stakeholder communication, and continuous monitoring (Williams, 1995; AS/NZS 4360, 1999; Ahmed, Kayis and Amornsawadwatana, 2007).

In RETIME, a risk management procedure has been proposed based on established risk management practices outlined in the literature and industry standards, leading to the creation of a risk management process diagram. Figure 2 illustrates the comprehensive approach to risk identification, assessment, response planning, mitigation, and monitoring strategies within the RETIME project.



Figure 2. Risk Management Diagram.

RETIME consortium members must ensure adherence to the project's established risk management processes and protocols, as outlined in the Risk Management Plan (RMP). This includes actively participating in regular reviews of the risk register and ensuring compliance with EU project guidelines and standards.

3.1. Risk Identification

3.1.1. Foreseen and unforeseen potential risks

Risk identification is an ongoing process throughout the entire project lifecycle. During the project proposal stage, consortium partners had identified potential risks and deviations that could impact the implementation of tasks, required actions, deliverables, and milestones. This process enabled the consortium to anticipate additional risks beyond those initially identified in the GA, while refining the suggested mitigation measures to account for the diversity of work packages and country-specific contexts. The identified risks span various aspects of the project, including technical research, innovation, pilot implementation, project management, evaluation, sustainability, dissemination, and exploitation.

3.1.2. External potential risks

Managing external risks present a significant challenge for project managers, as these barriers are often beyond their direct control and cannot typically be reduced or avoided. However, in a large and diverse consortium like RETIME, it is crucial to proactively identify such risks. If any external risks materialise during the project's lifetime, only then they will be assessed and recorded in the Risk Assessment Log (RAL).
Any unforeseen external barriers or requirements will be promptly added to the list. Table 5 outlines all barriers and requirements, aligning with those defined in the GA.

Table 4. List of external potential barriers and requirements.

Potential barriers and requirements description	
No.	**Political barriers**
PB1	Slow uptake of EU legislation to support building resilience in the light of changing climate due to the lack of policy instruments and decision support tools.
No.	**Economic barriers**
EB1	Lack of funding to install and maintain RETIME installations (e.g., sensors, totem) and difficulties in the identification of viable business models to cover resilience costs.
No.	**Social barriers**
SB1	Difficulties involving vulnerable groups (e.g., low-income population groups which are extremely vulnerable to energy poverty, young generation) and citizens in a scientific dialogue.
SB2	Limited acceptance of resilience-improving measures applied to the built heritage.
SB3	Lack of collaboration between consortium members.
No.	**Technological barriers**
TB1	Low data collection capabilities and difficulty in leveraging ICT results can hinder the adoption of specific climate adaptation technologies in the pilot areas.
TB2	The lack of technical expertise/skills and lack of interest can slow down or impede the deployment of measures and adoption of tools planned within RETIME.

Potential barriers and requirements description	
TB3	Difficulties in guaranteeing seamless integration and interoperability of adaptation solutions that are employed simulatively. Incompatibility between different technologies may hinder their combined effectiveness.
No.	**Environmental barriers**
ENVB1	Presence of multiple hazards (and their co-occurrence) and difficulties to predict long term climatic impacts at the building level.
ENVB2	Lack of adoption and slow uptake of nature-based solutions for building resilience.
ENVB3	Difficulty to fully validate RETIME results (e.g., due to the long-term impacts of project results or a need to face a critical event).
No.	**Regulatory barriers**
RB1	Bureaucratic hurdles can slow down the approval process.
No.	**Economic requirements**
ER1	The RETIME endeavour embraces the economic effort needed to acquire, process, and analyse the large dataset, ensuring the development of robust and impactful outcomes.
ER2	Prioritisation of available funds for increasing building energy efficiency and climate resilience.

3.2. Risk Analysis

All identified risks will be thoroughly analysed based on their likelihood of occurrence and potential severity of impact on the project. The Work Package Leaders (WPLs), Task Leaders (TLs), and Local Desk Members (LDMs), in collaboration with the Project Coordinator (PC), will assess the probability of each critical risk identified in Table 6.

Table 5. List of foreseen risks in RETIME project with its evaluation and status.

Critical Risks			
Consortium composition	**Research and Innovation Activities**	**Dissemination and Management Activities**	**Exploitation**
R1. Key partner leaves the project	**R3.** Delays or postponement of technological deployment	**R9.** Low engagement from stakeholders	**R12.** Budget and cost overruns
R2. Key researcher leaves the project	**R4.** Security and data privacy risks	**R10.** Mismatch between stakeholders' expectations and outcomes. Results do not meet local needs and preferences	**R13.** Difficulty in Technology Transfer
	R5. Intellectual Property Rights and licensing concerns	**R11.** Lack of collaboration and communication among team members of the consortium	**R14.** Insufficient Market Awareness
	R6. Data quality and integrity issues		

Critical Risks			
Consortium composition	**Research and Innovation Activities**	**Dissemination and Management Activities**	**Exploitation**
	R7. Integration challenges with existing systems		**R15.** Competing Technologies and Solutions
	R8. Inadequate testing and validation of results		

Newly risks along which specific measures and appropriate mitigation strategies will be presented to the General Assemblies by PC or relevant party, to ensure consortium-wide awareness.

Risks will be ranked based on the Risk Exposure Matrix (see Figure 3). Any changes in the risk level that could negatively impact the project will be raised at the General Assembly meetings by each risk owner/relevant partner. These changes will be reviewed, and, if necessary, new mitigation action or contingency plan determined to manage potential risk, before they cause any significant cost, schedule, or performance impact.

If any foreseen or unforeseen external potential risks (Table 4) will materialise, it will be presented to the General Assembly by the PC or by the risk owner. The relevant party will estimate the risk level (Figure 3) and will be assigned in accordance with the process outlined in *Section 3.2.1*.

3.2.1. Risk response planning

Risk exposure will be systematically measured by combining two critical factors: the *likelihood of a risk* materialising and its *potential severity of impact* on the project. This approach ensures a comprehensive understanding of each risk's significance and helps prioritise mitigation efforts effectively.

Likelihood: It refers to the probability or chance that a specific risk will occur during the project's lifecycle. To ensure clarity and consistency, the level of likelihood will be estimated and categorised into three levels: High, Medium, and Low, as indicated in Figure 3. This classification allows for an organised assessment of risks, helping project stakeholders focus their attention on those most likely to affect the project outcomes.

Severity: It measures the potential impact of a particular risk on the project's objectives. The level of severity will be estimated and categorised into three levels: High, Medium, and Low (Figure 3). Risks with High severity have the potential to significantly derail project milestones, while those with Medium or Low severity have a progressively reduced effect on the project's overall success.

Figure 3 presents the risk levels for likelihood and severity in the event of a risk occurrence within the project. It also includes the Risk Exposure Matrix, a tool for assessing risks based on their assigned levels and defines the risk rating/status terms used in the RETIME project.

Likelihood	Severity
High	High
Medium	Medium
Low	Low

Likelihood / Severity	High	Medium	Low
High	Critical	High	Medium
Medium	High	Medium	Low
Low	Medium	Low	Low

Critical	Risk is already present and likely to continue until mitigated.
High	Risk will likely occur within the next 3 - 6 months.
Medium	Risk will likely occur within the next 12 months.
Low	Risk will likely occur within the lifetime of the project.

Figure 3. Risk levels (Likelihood and Severity) and Risk Exposure Matrix.

By combining the two dimensions (Likelihood and Severity), risks are positioned within a Risk Exposure Matrix (REM) to provide a visual representation of their relative importance (Figure 3). This systematic approach supports informed decision-making by helping the team prioritise risks and allocate resources effectively to mitigate or manage them proactively. Table 6 provide a list of all identified risks outline in GA, along with their current periodic reporting status.

Table 6. List of foreseen risks in RETIME project with its evaluation and status.

Risk		**Risk level**		
No.	**Description**	**Likelihood**	**Severity**	**Risk rating**
R1	Consortium composition - Key partner leaves the project	Low	High	Medium
R2	Consortium composition - Key researcher leaves the project	Medium	Medium	Medium
R3	Research and Innovation Activities - Delays or postponement of technological deployment	High	High	Critical
R4	Research and Innovation Activities - Security and data privacy risks	Low	Medium	Low
R5	Research and Innovation Activities - IP and licensing concerns	Low	Medium	Low
R6	Research and Innovation Activities - Data quality and integrity issues	Low	Medium	Low
R7	Research and Innovation Activities - Integration challenges with existing systems	Medium	High	High
R8	Research and Innovation Activities - Inadequate testing and validation of results	Low	Medium	Low

Risk		Risk level		
No.	**Description**	**Likelihood**	**Severity**	**Risk rating**
R9	Dissemination and Management Activities - Low engagement from stakeholders	Medium	Low	Low
R10	Dissemination and Management Activities - Mismatch between stakeholders' expectations and outcomes. Results do not meet local needs and preferences	Low	Medium	Low
R11	Dissemination and Management Activities - Lack of collaboration and communication among team members of the consortium	Low	Medium	Low
R12	Dissemination and Management Activities - Budget and cost overruns	Low	Medium	Low
R13	Exploitation - Difficulty in Technology Transfer	Low	Medium	Low
R14	Exploitation - Insufficient Market Awareness	Low	Medium	Low
R15	Exploitation - Competing Technologies and Solutions	Medium	Medium	Medium

3.3. Risk mitigation and resolution strategies

After the risks have been identified, it is essential to implement mitigation strategies to effectively eliminate or reduce their potential impact on the project. Risks related to overall management, work packages, and pilot areas, along with their mitigation and contingency plans for foreseen risks, are defined in the Grant Agreement (GA), and the RAL. For any unforeseen risks that were added to the RAL, the corresponding mitigation measures and contingency plans will also be documented.

Once risks are identified and assessed, WPLs, TLs, and LDMs are responsible for developing and implementing appropriate mitigation strategies specific to their work packages and pilot sites. This includes ensuring that contingency plans are in place to address unforeseen challenges, such as delays in infrastructure setup, supply chain disruptions, or operational inefficiencies. Pilot area teams collaborate closely with WPLs, TLs, and the Project Coordinator (PC) to ensure alignment between local mitigation actions and the broader project risk management framework.

Risk resolution involves providing necessary support to the involved partners, increasing resources, responsibilities, and, if required, amending the project work plan to effectively address risks. For each identified risk, a mitigation strategy is selected based on the nature and severity of the threat. Below are the four mitigation strategies for addressing risks:

i) Accept: This approach is applied when the risk poses minimal or non-threatening impacts to the project. Work Package Leaders (WPLs), Task Leaders (TLs), and Local Desk Members (LDMs) are capable of effectively responding to the occurrence of the risk without additional measures.

No proactive action will be taken. However, this approach is only adopted when no feasible alternatives exist; otherwise, a more active risk management is recommended.

ii) Avoid: Eliminating the threat entirely by addressing its root cause is the focus of this strategy. For example, if delays are anticipated due to resource constraints, a qualified alternative team member may be identified to step in, ensuring that project progress continues without disruption. This strategy is particularly useful for risks that could significantly derail the project if left unaddressed.

iii) Mitigate: This strategy involves identifying and implementing measures to reduce the likelihood of the risk occurring or to limit its potential severity. Examples include improving communication workflows, introducing additional checks and balances, or allocating backup resources to critical tasks. The goal is to minimise the impact of the risk on the project's timeline, budget, or quality.

iv) Transfer: In this approach, the responsibility for managing the risk is transferred to an external party better suited to handle it. This could involve outsourcing specific project components or tasks to specialised service providers or contractors. By delegating responsibility, the project minimises exposure to risks outside its core expertise.

Each strategy is carefully selected and applied based on the assessed severity and likelihood of the risk, ensuring that the project remains on track and objectives are achieved effectively. Regular monitoring and re-evaluation of risks will guide the adaptation of these strategies throughout the project lifecycle.

3.3.1. Critical risks

This section of the report outlines all critical risks and corresponding mitigation strategies as defined in the GA.

R1 - Consortium composition - Key partner leaves the project

Mitigation measure In the event that the necessary competencies are not available within the consortium, the PC will recommend recruiting a new partner, subject to the approval of the Project Officer.

R2 - Consortium composition - Key researcher leaves the project

Mitigation measures If a suitable replacement cannot be identified within the consortium, the responsibility for the task will be reassigned to another partner, pending approval from the funding agency.

R3 - Research and Innovation Activities - Delays or postponement of technological deployment

Mitigation measures Consistently monitor project progress to effectively identify potential bottlenecks. Incorporate contingency buffers into the project schedule to account for unforeseen delays, ensuring they can address unexpected challenges that may arise during the technology development phase.

R4 - Research and Innovation Activities - Security and data privacy risks

Mitigation measures Establish robust security protocols to protect sensitive data and ensure compliance with data protection regulations, including GDPR and ethical guidelines.

R5 - Research and Innovation Activities - IP and licensing concerns

Mitigation measures Proactively identify and resolve potential intellectual property issues early in the project, establishing the arrangements within the consortium agreement.

R6 - Research and Innovation Activities - Data quality and integrity issues

Mitigation measures Data quality standards will be established prior to field data collection to ensure accuracy, completeness, consistency, and uniform semantics. Comprehensive validation and verification procedures will be implemented throughout data collection and integration, complemented by periodic audits to detect and resolve any discrepancies.

R7 - Research and Innovation Activities – Integration challenges with existing systems

Mitigation measures Evaluate the compatibility of new software tools with existing systems to ensure seamless operation. Implement gradual integration to reduce disruption to ongoing processes. Conduct unit tests to identify and address potential integration issues.

R8 - Research and Innovation Activities – Inadequate testing and validation of results

Mitigation measures Design robust and comprehensive testing protocols to validate research outcomes effectively. Ensure follow-up on the execution of testing and validation iterations to maintain quality and reliability.

R9 - Dissemination and Management Activities - Low engagement from stakeholders

Mitigation measures Key end-users and stakeholders will be identified early in the project and will remain engaged throughout by co-developing engagement actions. Consistent communication of the project's value and benefits will foster their involvement in achieving project's objectives and outcomes.

R10 - Dissemination and Management Activities - Mismatch between stakeholders' expectations and outcomes. Results do not meet local needs and preferences

Mitigation measures Consortium partners have long-term experience in fieldwork and civil engagement activities. The network includes mediators and

representatives from diverse groups, ensuring a broad and inclusive approach. Local stakeholders are actively engaged throughout the development process, with expectations carefully managed through transparent communication of the project's objectives and goals.

R11 - Dissemination and Management Activities – Lack of collaboration and communication among team members of the consortium

Mitigation measures Effective real-time communication protocols will be established to facilitate seamless collaboration and communication among consortium members. Regularly scheduled virtual and in-person meetings will be conducted to review progress and address challenges.

R12 - Dissemination and Management Activities – Budget and cost overruns

Mitigation measures Consistently monitor project expenditures and implement effective cost control measures. Ensure the prioritisation of project requirements and milestones.

R13 - Exploitation - Difficulty in Technology Transfer

Mitigation measures The consortium consists of both academic and industry partners with extensive experience in technological collaborations, enabling effective technology transfer and ensuring its successful implementation.

R14 - Exploitation - Insufficient Market Awareness

Mitigation measures A comprehensive marketing and communication strategy will be developed within RETIME to enhance awareness of the project's results and achievements. Additionally, collaboration with industry partners will further strengthen the project's visibility.

R15 - Exploitation - Competing Technologies and Solutions

Mitigation measures RETIME will continuously monitor the competitive landscape and adapt the project strategy accordingly. Efforts will focus on identifying and highlighting the advantages of RETIME solutions over competing alternatives to enhance awareness and market positioning.

3.3.2. External risks

Once unforeseen external risks are identified and added to the list of potential barriers and requirements, corresponding mitigation strategies will be documented as outlined in *Section 3.4*. The responsibility for developing mitigating strategies is defined in *Section 3.3*. Should these external risks materialise, the process outlined in *Section 3.1.2* and *Section 3.2* will be implemented to address and manage the risks effectively.

Foreseen external risks, along with their corresponding mitigation measures outlined in the GA are presented below.

Political or legislative barrier

PB1 - Slow uptake of EU legislation to support building resilience in the light of changing climate due to the lack of policy instruments and decision support tools.

Mitigation measures This project aims to emphasise the urgency of taking action and the economic justification for doing so by developing digital tools to enhance the understanding of threats, identify suitable and feasible solutions, and closely monitor their implementation and impact. Additionally, the project will assess policy gaps and opportunities within the pilot areas, leveraging insights from other projects to draft policy briefs for local governments.

Economic barrier

EB1 - Lack of funding to install, maintain RETIME installations (e.g., sensors, totem) and difficulties in the identification of viable business models to cover resilience costs.

Mitigation measures Securing funding is pivotal for facilitating the implementation of RETIME by local municipalities, private enterprises, and citizen organisations. Demonstrating economic sustainability and identifying viable business models are integral to the project's exploitation and stakeholder engagement strategy. Establishing strong connections with potential funders is crucial to ensuring the project's success and long-term continuity. By delivering a compelling value proposition and highlighting alignment with the funders' objectives, the prospects of securing the required financial support are significantly enhanced.

Social barriers

SB1 - Difficulties involving vulnerable groups (e.g., low-income population groups which are extremely vulnerable to energy poverty, young generation, etc.) and citizens in a scientific dialogue.

Mitigation measures RETIME collaborates with local associations representing the interests of vulnerable groups and citizens, as well as local organisations providing various forms of assistance. The project will leverage experience gained from organising citizen and stakeholder engagement activities and events in previous initiatives, such as CLIMAAX and CITYTHON 2022. Additionally, RETIME will develop emergency plans to address the needs

of vulnerable groups that are often challenging to engage through traditional methods.

SB2 - Limited acceptance of resilience-improving measures applied to the built heritage.

Mitigation measures RETIME will provide customised solutions and heritage-sensitive designs. The consortium brings together heritage professionals, conservation science experts, and local stakeholders with a vested interest in developing adaptive reuse solutions. These solutions carefully balance the essential requirements for interventions on traditional construction systems with energy-efficient retrofitting techniques.

SB3 - Lack of collaboration between consortium members.

Mitigation measures The RETIME consortium formalised a consortium agreement outlining the rules of collaboration, including the reporting responsibilities of each WP leader to the PC and the actions to be taken in the event of non-collaboration.

Technological barriers

TB1 - Low data collection capabilities and difficulty in leveraging ICT results can hinder the adoption of specific climate adaptation technologies in the pilot areas.

Mitigation measures RETIME establishes strong collaboration protocols with prospective stakeholders, fostering a solid foundation for effective partnerships. By implementing data normalisation and standardisation requirements, the project proactively mitigates technology-related risks. Emphasising stakeholder input and expert engagement, RETIME continuously refines its processes to integrate emerging trends and innovations. These strategic measures enhance the competitiveness of RETIME's outcomes, ensuring its leadership in the field.

TB2 - The lack of technical expertise/skills and lack of interest can slow down or impede the deployment of measures and adoption of tools planned within RETIME.

Mitigation measures RETIME will deliver workshops and publications to enhance the capabilities of stakeholders and end-users. Consortium members, including SMEs and leading technological research centres, supported by the Advisory Board, will provide expert insights and guidance on technology integration.

TB3 - Difficulties in guaranteeing seamless integration and interoperability of adaptation solutions that are employed simulatively. Incompatibility between different technologies may hinder their combined effectiveness.

Mitigation measures RETIME will leverage Open Application Programming Interface (API) tools, including OpenStreetMap and API static vector files, to enhance accessibility and integration. The project will also implement interoperability testing methodologies alongside continuous integration to ensure seamless functionality across systems.

Environmental barriers

ENVB1 - Presence of multiple hazards (and their co-occurrence) and difficulties to predict long term climatic impacts at the building level.

Mitigation measures RETIME adopts a comprehensive approach to hazard assessment, addressing both existing risks and those projected to worsen over time. This includes the strategic selection of buildings within the three pilot areas that are inadequately adapted to current and evolving threats.

ENVB2 - Lack of adoption and slow uptake of nature-based solutions for building resilience.

Mitigation measures RETIME builds upon the expertise gained from the well-established Nature-Based Solutions (NBS) knowledge platform, GeoIKP, as well as other projects developed by consortium members. It will adopt an inclusive, people-centred Engagement Ladder approach, progressing from informing stakeholders to empowering them in the decision-making process.

ENVB3 - Difficulty to fully validate RETIME results (e.g., due to the long-term impacts of project results or a need to face a critical event).

Mitigation measures Several consortium partners are actively collaborating with representatives of civil and political authorities in the three pilot areas and across Europe and will continue these partnerships beyond the project's completion. These ongoing collaborations will support initiatives aligned with RETIME's values and principles. Additionally, follow-up activities will be implemented to ensure long-term data validation and management.

Regulatory barrier

RB1 - Bureaucratic hurdles can slow down the approval process.

Mitigation measures The RETIME consortium includes public authorities that play a key role in ensuring the deployment of solutions in the pilot areas, as they either own or oversee local buildings. Additionally, they will be responsible for assessing and monitoring compliance with current regulations.

Economic requirements

ER1 - The RETIME endeavour embraces the economic effort needed to acquire, process, and analyse the large dataset, ensuring the development of robust and impactful outcomes.

Mitigation measures By leveraging data from Circular 2B, SUDO STOP CO2, and BuildON, RETIME can enhance its efforts in BIM modelling and Life-Cycle Assessment. The integration of commercial and openly available satellite data, such as those from Copernicus and European Space Agency (ESA) Sentinel missions, provides a valuable complement to in-situ data sources. Additionally, by applying advanced enhancement techniques to this imagery, the necessary level of detail can be achieved to support accurate analysis and decision-making.

ER2 - Prioritisation of available funds for increasing building energy efficiency and climate resilience.

Mitigation measures RETIME's vulnerable hotspot analysis will empower municipalities and local governments to enhance urban planning, optimise building maintenance, and allocate available funding more effectively based on vulnerability index assessments.

3.4. Risk documentation and reporting

Foreseen risks are carefully documented in the RAL, providing a baseline understanding of potential challenges that might impact project execution. Unforeseen risks that arise during project implementation require immediate attention and are promptly documented in the RAL (Annex B). The RAL serves as a dynamic and comprehensive tool for recording, evaluating, and managing risks throughout the project lifecycle. This log is continually updated to reflect the evolving risk and to ensure timely mitigation and response.

WPLs, TLs, and LDMs are responsible for not only identifying and categorising risks but also documenting the corresponding mitigation measures. Each risk entry in the RAL includes a detailed description of the risk, its potential impact on the project, the likelihood of its occurrence, and the measures planned or taken to address it. This ensures transparency and provides a clear framework for addressing risks at all levels of the project. The documented risks are evaluated collectively by all stakeholders to refine mitigation strategies.

Each member of the consortium is responsible for reporting risks in accordance with the risk management governance structure (Figure 1). Regular reporting of risk-related updates to the PC and PST is essential. Reports include detailed descriptions of risks, mitigation measures, and any deviations from the planned activities that may impact project milestones or outcomes.

Clear and consistent risk documentation and reporting promote responsibility and facilitate effective communication within the consortium, ensuring that risks are managed proactively and that project objectives remain on track. To support this process, a structured Risk Reporting Template (RRT) has been developed (see Table 9). This approach enhances the project's ability to navigate challenges while maintaining high-quality outcomes.

3.5. Risk monitoring and controlling

Each consortium member is responsible for monitoring the effectiveness of risk-handling action assigned to them. This responsibility includes overseeing both foreseen risks, identified during the proposal phase, and unforeseen risks that may arise and are subsequently added to the RAL (Annex B) throughout the project's duration. The RAL will be monitored in accordance with the GA to ensure effective risk management across all areas of the project.

Risks categorised as 'Critical' and 'High' will be closely tracked by the PC in collaboration with the responsible partner until their severity is reduced to 'Medium' or 'Low'. Medium-rated risks will be monitored by WPLs, TLs and PLs until they are classified as low risk. Even risks rated as 'Low', in terms of likelihood and severity, will undergo continuous monitoring to ensure they remain at the lowest level of impact. These low-rated risks will primarily be tracked within their respective WPs.

Monitoring responsibilities include regular risk assessments and progress reviews by WPLs and TLs, ensuring emerging risks are promptly identified and reported to the PC and PST. They are also responsible for seamlessly integrating risk management into their work package operations, maintaining alignment with the overall project risk management framework. For Local Desk Members, monitoring involves actively overseeing the performance of pilot areas, addressing operational challenges as they arise, and implementing corrective actions to mitigate risks effectively.

Continuous monitoring of risks is a critical responsibility for both work package teams and pilot area teams. This involves evaluating the effectiveness of mitigation measures, tracking shifts in risk levels, and ensuring any new risks are promptly documented and addressed. This proactive approach ensures that risks are managed effectively, allowing the project to meet its objectives without significant disruptions.

3.6. Risk communicating and reviewing

Ensuring the successful progress of the RETIME project relies on effective and transparent internal communication among consortium partners. Clear communication is crucial for mitigating the likelihood of potential risks and minimising their impact on the project. The communication strategy leverages the tools outlined in the deliverable *D7.1. Project*

Management Plan and Work Breakdown Structure Part 1 (Section 3.5). The objective of the communication is to understand the project risks and mitigation alternatives that are available to make informed decisions, as well as eliminate the barriers within the constraints of the project.

Consortium meetings bring the project participants together to discuss issues that have occurred or might occur in the foreseeable future of the project, and consult mitigation measures, as well as inform about the progress of the project. The schedule for these meetings is detailed in *D7.1 Project Management Plan and Work Breakdown Structure Part 1 (Section 3.4)*. These sessions promote collaboration and ensure alignment among all stakeholders.

Each partner is responsible for maintaining regular communication with the PC regarding the status and effectiveness of identified risks and associated mitigation plans. This communication helps to ensure that the RAL is updated, and tools remain relevant. The RAL (Table 8), which documents all project risks and mitigation measures and is a living document, is accessible on RETIME SharePoint and undergoes a formal review every six months.

The PC and PST hold meetings at least every two months to monitor the progress of ongoing risks and identify emerging ones. Additionally, every six months, WPLs, PST, and the PC exchange via email or meetings to evaluate risks identified during the preceding semester and to refine mitigation strategies as needed. The Risk Reporting Template (RRT, Table 9) has been developed to capture and communicate essential information to the PC and PST and is available on RETIME SharePoint.

List of References

Williams, T. (1995), “A classified bibliography of recent research relating to risk management”, European Journal of Operational Research, Vol. 85 No. 1, pp. 18-38.

Risk Management Standard AS/NZS 4360 (1999) Risk Management Standard AS/NZS 4360, Standards Association of Australia, Sydney.

Ahmed, A., Kayis, B. and Amornsawadwatana, S. (2007), "A review of techniques for risk management in projects", Benchmarking: An International Journal, Vol. 14 No. 1, pp. 22-36.

Annex A: List of RETIME Beneficiaries

Table 7. List of RETIME Beneficiaries.

No.	Short name	Legal name	Country
1	**ISCTE**	ASSOCIAÇÃO ISCTE CONHECIMENTO E INOVAÇÃO - CENTRO DE VALORIZAÇÃO E TRANSFERÊNCIA DE TECNOLOGIAS	PT
2	**UNIZA**	ŽILINSKÁ UNIVERZITA V ŽILINE	SK
3	**DTU**	DANMARKS TEKNISKE UNIVERSITET	DK
4	**WEO**	WEO SAS	LU
5	**KAJO**	KAJO SRO	SK
6	**ICONS**	FONDAZIONE ICONS	IT
7	**ONE**	ONE TEAM SRL	IT
8	**TUU**	TUU BUILDING DESIGN MANAGEMENT LDA	PT
9	**UPORTO**	UNIVERSIDADE DO PORTO	PT
10	**LIST**	LUXEMBOURG INSTITUTE OF SCIENCE AND TECHNOLOGY	LU
11	**TEC**	FUNDACION TECNALIA RESEARCH & INNOVATION	ES
12	**UD**	UNIVERSIDAD DE LA IGLESIA DE DEUSTO ENTIDAD RELIGIOSA	ES
13	**THK**	TECHNISCHE HOCHSCHULE KÖLN	DE
14	**ŽSK**	ŽILINA SELF-GOVERNING REGION	SK
15	**CML**	CÂMARA MUNICIPAL DE LISBOA	PT
16	**IBS**	INSTITUTE OF BALTIC STUDIES	EE
17	**TEAM**	TEAM INGENIERIA Y CONSULTORIA, SOCIEDAD LIMITADA	ES
18	**VELT**	VELTIS RATING SL	ES

Annex B: Risk Assessment Log

Table 8. RETIME Risk assessment log.

RETIME Risk Assessment Log								Review date (10/2024):					
				Inherent Risk (without control)					Residual Risk (with mitigation)				
Risk No	**Date**	**WP/ Task No**	**Risk description**	**Likelihood**	**Severity**	**Risk rating**	**Risk mitigation**	**Date of review**	**Likelihood**	**Severity**	**Risk rating**	**Responsible**	**Comment**
R1	Foreseen (proposal)	1,2, 3,4, 5,6, 7	Consortium composition - Key partner leaves the project	Low	High	Medium	If competencies are not found within the consortium, the Project Coordinator will propose recruiting a new partner with agreement of the Project Officer.	10/31/2024	Low	High	Medium	WP1, WP2, WP3, WP4, WP5, WP6, WP7	As referenced in WP meetings held prior to 31 October 2024.
R2	Foreseen (proposal)	1,2, 3,4, 5,6, 7	Consortium composition - Key researcher leaves the project	Medium	Medium	Medium	If replacement is not viable within consortium, task responsibility is assigned to other partner after agreement	10/31/2024	Medium	Medium	Medium	WP1, WP2, WP3, WP4, WP5, WP6, WP7	As referenced in WP meetings held prior to 31 October 2024.

							of the funding agency.						
R3	Foreseen (proposal)	3,4	Research and Innovation Activities - Delays or postponement of technological deployment	High	High	Critical	Regularly monitor progress for identify potential bottlenecks. Build contingency buffers into the project schedule to account for unforeseen delays. These buffers can address unforeseen challenges that might emerge during the technology development phase.	10/31/2024	High	High	Critical	WP3, WP4	As referenced in WP meetings held prior to 31 October 2024.
R4	Foreseen (proposal)	1,2, 3,4, 5,6, 7	Research and Innovation Activities - Security and data privacy risks	Low	Medium	Low	Implement strong security measures to safeguard sensitive data. Comply with data protection regulations,	10/31/2024	Low	Medium	Low	WP1, WP2, WP3, WP4, WP5, WP6, WP7	As referenced in WP meetings held prior to 31 October 2024.

							GDPR, ethical guidelines.						
R5	Foresee (proposal)	1,2,3,4,5,6,7	Research and Innovation Activities - IP and licensing concerns	Low	Medium	Low	Identify and address potential intellectual property issues early in the project in the consortium agreement.	10/31/2024	Low	Medium	Low	WP1, WP2, WP3, WP4, WP5, WP6, WP7	As referenced in WP meetings held prior to 31 October 2024.
R6	Foresee (proposal)	1,2,3,4,5,6,7	Research and Innovation Activities - Data quality and integrity issues	Low	Medium	Low	Data quality standards will be established pre-field data collection to ensure accuracy, completeness, consistency, and shared semantics. Robust validation and verification procedures will be applied during data collection and integration, with periodic audits to identify and	10/31/2024	Low	Medium	Low	WP1, WP2, WP3, WP4, WP5, WP6, WP7	As referenced in WP meetings held prior to 31 October 2024.

							address discrepancies.						
R7	Foreseen (proposal)	3,4	Research and Innovation Activities - Integration challenges with existing systems	Low	High	Medium	Analyse compatibility between the new software tools and existing systems. Implement gradual integration to reduce disruption to ongoing processes. Perform unit tests to check for integration problems.	10/31/2024	Low	High	Medium	WP3, WP4	As referenced in WP meetings held prior to 31 October 2024.
R8	Foreseen (proposal)	3,4, 5	Research and Innovation Activities - Inadequate testing and validation of results	Low	Medium	Low	Design robust and comprehensive testing procedures to validate research outcomes. Follow up on the implementation of testing and	10/31/2024	Low	Medium	Low	WP3, WP4, WP5	As referenced in WP meetings held prior to 31 October 2024.

							validation iterations.						
R9	Foreseen (proposal)	2,5, 6	Dissemination and Management Activities - Low engagement from stakeholders	Medium	Low	Low	Critical end-users and stakeholders will be identified early in the project, and they will remain engaged throughout by co-developing engagement actions. Regular communication of project value and benefits will inspire involvement in achieving goals and outcomes.	10/31/2024	Medium	Low	Low	WP2, WP5, WP6	As referenced in WP meetings held prior to 31 October 2024.
R10	Foreseen (proposal)	2,5, 6	Dissemination and Management Activities - Mismatch between stakeholders' expectations and outcomes.	Low	Medium	Low	Consortium partners have long-term experience in fieldwork and civic engagement activities. Mediators and representatives of different	10/31/2024	Low	Medium	Low	WP2, WP5, WP6	As referenced in WP meetings held prior to 31 October 2024.

			Results do not meet local needs and preferences				groups are part of the network of consortium partners. Local stakeholders are involved throughout the development process. Manage expectations through transparent communication about the project's goals.						
R11	Foreseen (proposal)	1,2,3,4,5,6,7	Dissemination and Management Activities - Lack of collaboration and communication among team members of the consortium	Low	Medium	Low	Efficient and real-time communication protocols will be set up. Virtual and in-person meetings will be scheduled regularly to discuss progress and challenges.	10/31/2024	Low	Medium	Low	WP1, WP2, WP3, WP4, WP5, WP6, WP7	As referenced in WP meetings held prior to 31 October 2024.
R12	Foreseen (proposal)	7	Dissemination and Management Activities - Budget and	Low	Medium	Low	Regularly monitor project expenditures and implement cost control	10/31/2024	Low	Medium	Low	WP7	As referenced in WP meetings held prior to

			cost overruns				measures. Prioritise project requirements and milestones.					31 October 2024.
R13	Foreseen (proposal)	6	Exploitation - Difficulty in Technology Transfer	Low	Medium	Low	The consortium comprises academic, and industry partners experienced in technological collaborations, which will facilitate technology transfer and ensure its successful implementation.	10/31/2024	Low	Medium	Low	WP6	As referenced in WP meetings held prior to 31 October 2024.
R14	Foreseen (proposal)	6	Exploitation - Insufficient Market Awareness	Low	Medium	Low	A comprehensive marketing and communication strategy will be developed within RETIME to raise awareness about the project results and achievements. Furthermore, the collaboration	10/31/2024	Low	Medium	Low	WP6	As referenced in WP meetings held prior to 31 October 2024.

							with the industry partners will amplify the project visibility.						
R15	Foreseen (proposal)	6	Exploitation - Competing Technologies and Solutions	Medium	Medium	Medium	RETIME will continuously monitor the competitive landscape and adapt the project strategy accordingly. We will identify and create awareness of the advantages of RETIME solutions over competitors.	10/31/2024	Medium	Medium	Medium	WP6	As referenced in WP meetings held prior to 31 October 2024.

Annex C: Risk Reporting Template

Table 9 outlines the Risk reporting template, which serves as a structured tool for systematically documenting, assessing, and communicating risks within the RETIME project.

Reporting Date:

Reporting person:

Table 9. Risk reporting template.

Risk ID	Risk description	Risk level (RL)	Current RL	Comment	Mitigation measures	Risk owner
Foreseen Risks		(Likelihood/ Severity previously estimated in GA)	(Likelihood/Severity or no changes have been identified)	If any changes occur, provide more details, and select mitigation strategy (Avoid, mitigate, accept, transfer)	If different from GA, description of the mitigation measures (objective, scope)	Responsible person / Task/ date of identification
R1	Consortium composition - Key partner leaves the project	Low/High				
R2	Consortium composition - Key researcher leaves the project	Medium/Medium				
R3	Research and Innovation Activities - Delays or postponement of technological deployment	High/High				
R4	Research and Innovation Activities - Security and data privacy risks	Low/Medium				
R5	Research and Innovation Activities - IP and licensing concerns	Low/Medium				

R6	Research and Innovation Activities - Data quality and integrity issues	Low/Medium				
R7	Research and Innovation Activities - Integration challenges with existing systems	Medium/High				
R8	Research and Innovation Activities - Inadequate testing and validation of results	Low/Medium				
R9	Dissemination and Management Activities - Low engagement from stakeholders	Medium/Low				
R10	Dissemination and Management Activities - Mismatch between stakeholders' expectations and outcomes. Results do not meet local needs and preferences	Low/Medium				
R11	Dissemination and Management Activities - Lack of collaboration and communication among team members of the consortium	Low/Medium				
R12	Dissemination and Management Activities - Budget and cost overruns	Low/Medium				
R13	Exploitation - Difficulty in Technology Transfer	Low/Medium				

R14	Exploitation - Insufficient Market Awareness	Low/Medium				
R15	Exploitation - Competing Technologies and Solutions	Medium/Medium				
Unforeseen Risk / Emerging Risks				Provide more details about the risk, strategy that will be applied to manage the risk (Avoid, mitigate, accept, transfer).	Provide description of the mitigation measures (objective, scope).	
R16						
External potential Risks			Complete this column only if the risk materialises, and likelihood is high, and severity is high.	If the risk materialises, provide more detailed information (cause) and outline possible mitigation strategy (Avoid, mitigate, accept, transfer).	If different from GA, description of the mitigation measures (objective, scope)	
PB1	Slow uptake of EU legislation to support building resilience in the light of changing climate due to the lack of policy instruments and decision support tools.					

EB1	Lack of funding to install, maintain RETIME installations (e.g., sensors, totem) and difficulties in the identification of viable business models to cover resilience costs.					
SB1	Difficulties involving vulnerable groups (e.g., low-income population groups which are extremely vulnerable to energy poverty, young generation, etc.) and citizens in a scientific dialogue.					
SB2	Limited acceptance of resilience-improving measures applied to the built heritage.					
SB3	Lack of collaboration between consortium members.					
TB1	Low data collection capabilities and difficulty in leveraging ICT results can hinder the adoption of specific climate adaptation technologies in the pilot areas.					
TB2	The lack of technical expertise/skills and lack of interest can slow down or impede the deployment of measures and adoption of tools planned within RETIME.					

TB3	Difficulties in guaranteeing seamless integration and interoperability of adaptation solutions that are employed simulatively. Incompatibility between different technologies may hinder their combined effectiveness.					
ENVB1	Presence of multiple hazards (and their co-occurrence) and difficulties to predict long term climatic impacts at the building level.					
ENVB2	Lack of adoption and slow uptake of nature-based solutions for building resilience.					
ENVB3	Difficulty to fully validate RETIME results (e.g., due to the long-term impacts of project results or a need to face a critical event).					
RB1	Bureaucratic hurdles can slow down the approval process.					
ER1	The RETIME endeavour embraces the economic effort needed to acquire, process, and analyse the large dataset, ensuring the development of robust and impactful outcomes.					

ER2	Prioritisation of available funds for increasing building energy efficiency and climate resilience.					